





31 South Madison Street • Evansville, Wisconsin 53536-1399 Office: (608) 882-2280

Service Dept.: (608) 882-2288 Fax: (608) 882-2282

January 29, 2001

Jim Loock, Chief Electric Engineer Public Service Commission 610 N. Whitney Way P.O. Box 7854 Madison, WI 53707-7854

RE:

In the Matter of Filing Plans for Appropriate Inspection and

Maintenance, PSC Rule 113.0607.

Dear Mr. Loock:

Enclosed for filing are 3 copies of Evansville Water & Light Department's Preventative Maintenance Plan detailing inspection maintenance schedules, condition rating criteria, corrective action schedules, record keeping procedures and report filing schedules as documented in this rule.

Very truly yours,

Jane M. Oberdorf

Jane Oberders

Financial Director

**Enclosures** 

RECEIVED

JAN 3 0 2001

**Electric Division** 

# PREVENTATIVE MAINTENANCE PLAN

# **Evansville Water & Light Department**

FILING DEADLINE FEBRUARY 1, 2001

January 29, 2001

Jane M. Oberdorf
31 S. Madison Street
Evansville, WI 53536
(608) 882-2280
jmoberdo@inwave.com

# RECEIVED

JAN 3 0 2001

Electric Division

This plan was prepared by the MEUW work group for PSC Rule 113.0607 for use by the 82 municipal electric utilities in Wisconsin and endorsed by PSC staff as meeting the requirements of Rule PSC 113.0607.

### TABLE OF CONTENTS

		Page
I.	Preventative Maintenance Plan	2
II.	Inspection Schedule and Methods	2
III.	Condition Rating Criteria	3
IV.	Corrective Action Schedule	4
V.	Record Keeping	4
VI.	Reporting Requirements	4
VII.	Distribution – overhead inspection guide	5
VIII.	Distribution – underground inspection guide	8
IX.	Substation - Monthly inspection guide	10
X.	Substation – Annual Inspection Guide	18
XI.	Transmission – Annual Inspection Guide	20
XII.	Transmission – 5 Year Inspection Guide	21
	FORMS	
OVER	RHEAD DISTRIBUTION INSPECTION FORM	7
UNDI	ERGROUND DISTRIBUTION INSPECTION FORM	9
MON	THLY SUBSTATION INSPECTION FORM	13 – 17
ANNU	JAL SUBSTATION INSPECTION FORM	19
ANNU	JAL TRANSMISSION INSPECTION FORM	22

### I. Preventative Maintenance Plan

The PSC 113.0607 rule reads;

Appropriate inspection and maintenance: system reliability.

- (1) PREVENTATIVE MAINTENANCE PLAN. Each utility or other person subject to this chapter, including persons who own electric generating facilities in this state who provide service to utilities with contracts of five years or more, shall develop and have in place its own preventative maintenance plan. This section is applicable to electric generating facilities as set forth at s. 194.491(5)(a)(1), Stats. Each plan shall include, among other things, appropriate inspection, maintenance and replacement cycles where applicable for overhead and underground distribution plant, transmission, generation<sup>1</sup>, and substation facilities.
- (2) CONTENTS OF THE PLAN. (a) *Performance standard*. The Preventative Maintenance Plan shall be designed to ensure high quality, safe, and reliable service, considering: cost, geography, weather, applicable codes, national electric industry practices, sound engineering judgment and experience.
- 1 PSC staff interpretation is that generation applies to individual generators equal to or greater than 50 MW.

### II. Inspection Schedule and Methods:

The purpose of this plan is to maintain or improve the electrical system reliability with the objective of increased municipal loyalty and satisfaction from our constituents. The goals are to meet and exceed the schedules established in this plan.

Exception reporting (inspected equipment not in good condition) will be the method of documentation on all inspection forms.

The scope of this plan is traditional and uses proven maintenance techniques. Unique operating and maintenance philosophies have not been considered. Also, manufacturer defects will be dealt with as they are communicated to this utility.

**EVERY** 

SCHEDULE:	MONTHLY	ANNUAL	5 YEARS
Transmission (≥69Kv and above)		X	X
Substations	X	X	
Distribution (OH & UG)			X

The inspection of Distribution facilities will be by individual substation circuits on a 5-year cycle such that the entire system will be inspected every 5 years. Inspector instructions for inspecting all facilities and forms are included with the plan.

METHODS: Five criteria groups will be used to complete the inspection of all facilities.

- 1. <u>IR</u> infrared thermography used to find poor electrical connections and/or oil flow problems in equipment.
- 2. <u>RFI</u> Radio Frequency Interference, a byproduct of loose hardware and connections, is checked using an AM radio receiver.
- 3. <u>SI</u> structural integrity of all supporting hardware including poles, crossarms, insulators, structures, bases, foundations, buildings, etc.
- 4. <u>Clearance</u> refers to proper spacing of conductors from objects, trees and other utility cables.
- 5. <u>EC</u> equipment condition on non-structural components such as circuit breakers, transformers, regulators, reclosers, relays, batteries, capacitors, etc.

### III. Condition Rating Criteria:

This criterion, as listed below, establishes the condition of a facility and also determines the repair schedule to correct deficiencies.

- 0) Good condition
- 1) Good condition but aging
- 2) Non-critical maintenance required normally repair within 12 months
- 3) Priority maintenance required normally repair within 90 days
- 4) Urgent maintenance required report immediately to the utility and repair normally within 1 week

### IV. Corrective Action Schedule

The rating criteria as listed above determine the corrective action schedule.

### V. Record Keeping

All inspection forms and records will be retained for a minimum of 10 years. The inspection form contains all of the required critical information i.e. inspection dates, condition rating, schedule for repair and date of repair completion.

### VI. Reporting Requirements

A report and summary of this plan's progress will be submitted every two years with the first report due to the Commission by February 1, 2003. The report will consist of a letter documenting the percent of inspections achieved compared to the schedule and a description of maintenance achieved within the scheduled time allowance.

### VII DISTRIBUTION - OVERHEAD INSPECTION GUIDE

### **STRUCTURE**

- Pole Condition
- Pole Leaning
- Crossarm Condition
- Insulators, Deadend, Pin
- Excess Fill or Soil Removal
- Pole Steps
- Grounds Intact
- Ground Molding
- Down Guys
- Guy Markers
- Guy Bonding/Insulator
- Signage Location Number, Warning Sign
- Customer Equipment
- Conductor
- Tie Wires
- U Guard/Conduit Condition

### **EQUIPMENT**

- Transformers
  - ✓ Oil Leaks
  - ✓ Bushing Condition
  - ✓ Grounding/Bonding
- Capacitors
  - ✓ Fuses Blown
  - ✓ Bushing Condition
  - ✓ Oil Leaks
  - ✓ Tank Bulged
  - ✓ Switches, Oil, Vacuum
  - ✓ Control Conduit/Wiring
  - ✓ Grounding/Bonding
- Switches GOAB, Inline, Disconnect
  - ✓ Insulator Condition
  - ✓ Operating Handle/Locks
  - ✓ Linkage
  - ✓ Grounding/Bonding
  - ✓ Switch Number
- Cutouts
  - ✓ Insulator Condition
  - ✓ Fuse Size Tag

## VII DISTRIBUTION - OVERHEAD INSPECTION GUIDE (con't)

### **EQUIPMENT (CON'T)**

- Arrestor
  - ✓ Insulator Condition
  - ✓ Connections
  - ✓ Ground Lead Disconnection
- Cable Terminators
  - ✓ Insulator Condition
  - ✓ Grounding/Bonding

### **CLEARANCES**

- Ground Line
- Buildings, Bridges, Swimming Pool, Etc.
- Communications Facilities
- Fuel Tanks
- Other Electric Utilities
- Transmission Lines
- Over Streets, Roads, Alleys, Highways
- Tree Trimming
  - ✓ Clearance From Line
  - ✓ Vines on Poles
  - ✓ Danger Trees

### **INFRARED SCAN**

- Main Three-Phase Feeders
- Priority Overhead Transformer Banks
  - ✓ Bushing Connectors Primary
  - ✓ Bushing Connectors Secondary
  - ✓ General Tank Heating
- Current & Voltage Transformers if Applicable

### RFI CHECK

• OH system with AM radio as each circuit is inspected

_
≥
Ö
ĭ
Z
0
Ë
N
ā
လွှ
_
Z
2
5
$\overline{\mathbf{m}}$
뭂
5
$\stackrel{\sim}{\sim}$
$\overline{}$
A
Ψ
☆
讧
$\geq$
J

				- 1	- 1															
ا			orrected By	၁																
Ckt		ected.	noO metl ets	a																
Inspected by Sub	COMMENTS	Rating Criteria  0) Good Condition	1) Good Condition but aging 2) Non-critical Maintenance Required 3) Priority Maintenance Required 4) Urgent Maintenace Required																	
		on Clearance	Sommunicatio		+	╁	╅	╁	+		+	+	$\dashv$	+	-	-	-	- -	4	_
İ	CLEARANCE		Streets, Road		†	+-	+-	+	十		+	+	$\dashv$	+	+-	$\dashv$	+	+	+	$\dashv$
	₽ A		Suilding Clear			T	1	十	$\top$	十	+	_	+	+	╁	+-	+	+	╫	$\dashv$
Date	兴	Slearances	Ground Line (	,		1	$\top$	十	1	十	+	+	+	十	+	$\dashv$	+	+-	+	$\dashv$
Õ	L	6	riee Trimmin							1	$\top$	7	$\top$	十	+	+	+	+	+	-
	1.		Street Light							$\top$	$\top$	$\top$	1	十	+	+	$\top$	+	+	$\dashv$
			Terminators			T		T			1	$\top$	1	╅	+	+-	+	+	+	ᅱ
	Ž		<b>Sneters</b>				T		1			$\top$	<b>†</b> -	$\top$	+	+	+	-	+-	$\dashv$
	EQUIPMENT		Cutouts					T		1		十	<del> </del>	+	$\top$	+	+	+	+	┪
Σ	П		Switches					T			1	+		$\top$	十	+	$\dashv$	$\top$	╁	┪
K	<u></u>		Transformer						1		1	$\top$	1	$\top$	+	+	$\top$	+	+	ᅥ
F	ļ		RFI Check								1		1-	1	$\top$	+	+	+	╅╴	$\dashv$
Ž			noJ\bisue'U				1	T			7	十	1	$\top$	+	+-	+	+-	╅╴	$\dashv$
2			Conductor ar						Τ	T				十	+	+	<b>T</b>	_	+	┪
ပ			Customer Eq										1	1	1	1	+	+	╁	$\dashv$
H	A.		Signs, Loc#,										T			1	T	1	1	7
ळ	STRUCTURE		Guy Bond, In								Τ					1	7	1	†	7
<b>=</b>	2		Down Guys			ļ	<u> </u>								T				┰	7
Z	STR	ct, Molding	Grounds Inta				L										1		†	7
Ĕ	, , , , , , , , , , , , , , , , , , ,		Pole Steps				<u> </u>								T	T			$\top$	7
$\gtrsim$			Soil Conditio					L.									T			7
ZE			Insulators, D				<u> </u>	<u> </u>					$oxed{\Box}$		$\prod_{i=1}^{n}$			T	1	7
Ë	}		Crossam Co				<u> </u>	<u> </u>		_										7
품		nainea I/ao	Pole Condition				_	<u> </u>	<u> </u>	ļ	↓_	<u> </u>								
OVERHEAD DISTRIBUTION INSPECTION FORM	MAP AREA		LOCATION																	

### VIII DISTRIBUTION - UNDERGROUND INSPECTION GUIDE

# STRUCTURAL (Exterior & Interior) Transformer, Primary Pedestal, Secondary Pedestal, Switchgear.

- Enclosure Condition
- Level/Leaning
- Security
- Grade/Accessibility (Shrubs, Customer Facilities, Fill/Excavation)
- Numbering
- Voids/Gaps
- Signage Location Number, Warning Sign
- Pad/Vault Condition

### **EQUIPMENT**

- Transformers
  - ✓ Oil Leaks
  - ✓ Bushing Condition
  - ✓ Grounding/Bonding
  - ✓ Elbows
  - ✓ Arrestors
  - ✓ Feed-Through
  - ✓ Cable Condition
  - ✓ Secondary Connections
- Primary Pedestals
  - ✓ Elbows
  - ✓ Junction Condition
  - ✓ Grounding/Bonding
- Secondary Pedestals
  - ✓ Secondary Connections
- Switches URD Switchgear
  - ✓ Insulator Condition
  - ✓ Operating Handle Security
  - ✓ Linkage
  - ✓ Grounding/Bonding
  - ✓ Switch Number/Fuse Size & Number

### INFRARED SCAN and RFI CHECK

- Main Three-Phase Feeders (Risers & Switchgear)
- Priority URD Transformer Banks
  - ✓ Bushing Connectors Primary
  - ✓ Bushing Connectors Secondary
  - ✓ General Tank Heating

Maintenance Plan Format
MEUW - Preventative I

	Γ			Т	Τ	Т	Т	Т		Γ	Т	Т	_	$\top$	_	_	_		<del></del>	
		cted By																		
		ltem Corrected	Date																	
Sub Circuit	OTMENTO	Rating Criteria 0) Good Cond 1) Good Cond 2) Non-critical 3) Priority Mai 4) Urgent Mai																		
ρ	/ RFI Scan	bns agnirlaug, snemotanart DRU (d gnibeer	Priori   YusT																	
Inspected by	R/R	Three Phase Feeders, Risers & hygear	<b>Main</b> Switc															T	T	1
-Inspe		:hes, Signage, Insulators, Security, ge, Ground, Bonds	Swike Linka						1	1									†	
	ENT	ndary Pedestals, Connections	OSeco					1	1	7							$\dagger$	$\dagger$	$\dagger$	$\dagger$
	EQUIPMENT	กล <b>ry Pedestals</b> , Elbows, unding, Bonds,Junction cond.	nin9 Ionə															1	1	T
RM Date	Ш	aformera, Leake, Bushings, nding, Bonds, Elbows, Arrestors, Cable Connections	Groun																-	-
F0F		\ Vault Condition	Pad						T	1	7						T	T	$\dagger$	†
TION		əger	ıßıS									-					T	T	T	T
PEC	l W	sde5 / sb	νοίοV																T	
SNI	IS IS	gunedn	Mur								Ī									
Į	STRUCTURE	de / Accessibility	Gra																	
RIBU		(t) Ajun:	)9S																	
ISTE		ening / Leaning	/e/																	
O O		closure Condition	vu∃																	
UNDERGROUND DISTRIBUTION INSPECTION FORM	MAP AREA	EQUIPMENT	LOCATION																	

### IX SUBSTATION - MONTHLY INSPECTION GUIDE

### TRANSFORMER MAIN TANK:

- Oil in bushings
- Bushing and arrestor porcelain
  - ✓ Cracks or chips
  - ✓ Rust or dirt
- Oil leaks
  - ✓ Main tank
  - ✓ Sample valves
  - ✓ Radiators
- Radiator bank
  - ✓ warm on top, cool at bottom
- Tank pressure
- Tank oil level
- Temperature gauge
- Cooling fans

### TRANSFORMER LTC or VOLTAGE REGULATORS:

- Tank oil level
- Drag hand positions
- Cabinet light
- Operation count
- Tank pressure
- Cabinet heater
- Cabinet contamination

### TRANSMISSION CIRCUIT BREAKERS:

- OPEN/CLOSED indicator
- CHARGED/DISCHARGED indicator
- Cabinet light
- Cabinet heater
- Operations counter
- Bushings and supports
  - ✓ Cracks or chips
  - ✓ Rust or dirt
- Line and load side disconnect switches
  - ✓ Properly labeled
  - ✓ Aligned properly
- Handles grounded
- Emergency trip button
- Air / Oil compressors
- Air / Oil pressure gauge
- Spring operated mechanism
- Oil level gauge
- Tank oil leaks
- Reset switch
- Cabinet contamination
- Vents clean
- Gas pressures for GCBs

### IX SUBSTATION - MONTHLY INSPECTION GUIDE (con't)

### FEEDER CIRCUIT BREAKERS / RECLOSERS

- OPEN/CLOSED indicator
- CHARGED/DISCHARGED indicator
- Cabinet light
- Cabinet heater
- Operations counter
- Bushings and supports
  - ✓ Cracks or chips
  - ✓ Rust or dirt
- Line and load side disconnect switches
  - ✓ Labeled properly
  - ✓ Aligned properly
  - ✓ Handles grounded
- Emergency trip button
- Oil level gauge
- Tank oil leaks
- Reset switch
- Cabinet contamination
- Vents clean
- Gas pressures for GCBs

### HIGH AND LOW VOLTAGE BUSS WORK:

- Bushing, insulator, arrestor, and support insulators
  - ✓ Chips or cracks
  - ✓ Rust or dirt
- Bird nests
- Potential transformers bushings
  - ✓ Cracks or chips
  - ✓ Rust or dirt
- Cable terminators
  - ✓ Leaking fluid
  - ✓ Cracks or chips

### **MANUAL SWITCHES:**

- Properly labeled
- Ground connections
- Positioning and alignment
- Bushing and support insulators
  - ✓ Cracks or chips
  - ✓ Rust or dirt

### **MOTOR OPERATED SWITCHES:**

- OPEN/CLOSED indicator
- Properly labeled
- Cabinet heater
- Operations counter

### IX SUBSTATION - MONTHLY INSPECTION GUIDE (con't)

### **CONTROL HOUSE/MISCELLANEOUS:**

- Clock displays proper time
- AC/DC load center breakers
- Room temperature
- Rodents
- Panels labeled properly
- Panel lights
- Annunciator panel
- Panel meters
- SCADA system RTU
- SCADA alarms
- Position indicators agree
- Relay target information
- Emergency contact directory & dial tone for phone
- Safety Equipment

### **BATTERY:**

- Liquid levels
- Proper float voltage on charger and battery
- Specific gravity in pilot cell
- Personal Protective Equipment
- Connection corrosion
- Leaking cells
- Dated solution in eyewash station

### **YARD AND FENCE:**

- Fire extinguisher charged
- Fence ground connections
- Fence secured
- Security and emergency lights
- Site base and grade
- Standing water
- Warning signs

MONTHL	Y \$	SUBSTAT	ΓΙΟ	NI	NS	PE	CTIC	ON FORM	<del>-</del>
INSPECTED BY:								7111 01111	
DATE:									
SUBSTATION:		<del></del>					<del></del>		
						-			
TRANSFORMER MAIN TANK		RATING:	0	1	2	3	4	(Circle One)	
inspected	х		COI	MMEN	NTS_			DATE CORRECTED	CORRECTED
Oil in Bushings									<del></del>
Bushing and Arrestor									
Oil Leaks						-			
Main Tank									
Sample Valves									
Radiators									
Radiator Bank									
Tank Pressure							<del></del>		
Tank Oil Level									
Temperature Gauge	$\neg$ L				·				
Cooling Fans				<del></del>			<del></del>	+	
		_ ·							
							*		<del></del>
	$\top$							1	
TRANSFORMER LTC or VOLTAGE REGULATORS	<u> </u>	RATING:	0	1	2	3	4	(Circle One)	
Tank Oil Level								<del></del>	
Drag Hand Positions	1		<del></del>					+	<del> </del>
Cabinet Light				<del></del>				+	<del></del>
Operation Count								+	<del></del>
Fank Pressure								++	<del></del>
Cabinet Heater	$\neg \vdash$								
Cabinet Contamination								++	
	$\top$						<del></del>	+	<del></del>
								+	
	1							+	
					<del></del>			+	
	$\top$							+	
	_							++	
	_							<del></del>	
								1	

MONTHLY SUBSTATION INSPECTION FORM												
INSPECTED BY:												
DATE:												
SUBSTATION:	~											
HIGH VOLTAGE CIRCUIT BREAKER / CIRCUIT SWITCHER												
inspected	x	COMMENTS	DATE CORRECTE CORRECTED BY									
OPEN/CLOSED Indicator												
CHARGED/DISCHARGED Indicator												
Cabinet Light												
Cabinet Heater												
Operations Counter												
Bushings and Supports												
Line and Load Side Disconnect Switches												
Handles Grounded												
Emergency Trip Button												
Air Compressors - Air / Oil												
Air Pressure Gauge - Air / Oil												
Spring Operated Mechanism												
Oil Level Gauge												
Tank Oil Leaks												
Reset Switch												
Cabinet Contamination												
Vents Clean	$\prod$											
Gas Pressures for GCBs	$oxed{I}$											
	$oxed{oxed}$											

MONTHLY:	SI	JBSTATION INSPECTIO	NEODM
INSPECTED BY:		BOTATION INSPECTIO	N FURM
DATE:			
SUBSTATION:			
OSSO INTION.	_		Name of the last o
EEEDED OLDOUIT DOESN'EE			
FEEDER CIRCUIT BREAKER / RECLOSER		RATING: 0 1 2 3 4	(Circle One)
inspected	x	COMMENTS	DATE CORRECTED CORRECTED BY
OPEN/CLOSED Indicator			- Bi
CHARGED/DISCHARGED Indicator	Γ		
Cabinet Light	Г		
Cabinet Heater			
Operations Counter			
Bushings and Supports			<del> </del>
Line and Load Side Disconnect Switches			
Emergency Trip Button			<del> </del>
Oil Level Gauge			<del> </del>
Tank Oil Leaks			<del> </del>
Reset Switch			+
Cabinet Contamination			
Vents Clean			<del> </del>
Gas Pressures for GCBs			
			<del> </del>
			<del> </del>
	$\exists$		
	$\neg$		
	$\dashv$		
	$\dashv$		
	$\dashv$		
	寸		
	7		
	$\dashv$		
			<u>i.                                    </u>

MONTHLY SU	ÜĒ	STATIC	אר אר	ĪN!	SPI	ĒC.	TIO	N EODM	
INSPECTED BY:		OIAII	<u>//\</u>	1147	<u> </u>			NFURM	
DATE:									
SUBSTATION:									
oobo in the later of the later									
HIGH & LOW VOLTAGE BUSS WORK	<del></del>	RATING:	0	1	2	3	4	(Circle One)	
inspected	x		CO	MMEN	NTS			DATE CORRECTED	CORRECTED
Bushing, Insulator, Arrestor, and Supports	T							- Coldinate Library	D1
Bird Nests	T								<del> </del>
Transformer Bushings	T							+	<del> </del>
Cable Terminators	$\neg$								<del> </del>
	十							+	<del> </del>
	1								<del> </del>
	+								<u> </u>
MANUAL SWITCHES		RATING:	0	1	2	3	4	(Circle One)	
Properly Labeled	$\top$						<del></del>		
Ground Connections	+							+	
Positioning and Alignment	+							+	
Bushings and Supports	+					<del></del>			
	+								<del></del>
	+							4	
	+								
					<del></del>				
MOTOR OPERATED SWITCHES		RATING:	0	1	2	3	4	(Circle One)	
OPEN/CLOSED Indicator	$T_{\perp}$		-					T	
Proper Labeling				<del></del> -				++	
Cabinet Heater								+	
Operations Counter	1				<del></del>			+	
ocking criteria	+		<del></del>					++	
	+							++	
	+							++	
									,

MONTHLY	SI	UBSTAT	101	N II	NSF	EC	TIC	N FORM	
INSPECTED BY:									
DATE:		······································					~	<del></del>	
SUBSTATION:					<del></del> -				<del></del>
							<del></del>		
CONTROL HOUSE/MISCELLANEOUS	S	RATING:	0	1	2	3	4	(Circle One)	
inspected	x		СО	MME	NTS			DATE CORRECTED	CORRECTE
Clock Displays Proper Time							***		
AC/DC Load Center Breakers								<u> </u>	
Room Temperature						···			
Rodents									
Panels Labeled Property									
Panel Lights					<del></del>				
Annunciator Panel					· · · · · · · · · · · · · · · · · · ·				<del></del>
Panel Meters									
SCADA System RTU									
SCADA Alarms									
Position Indicators Agree									
Relay Target Information									
Emergency Contact Directory & Dialtone for Phone							-		
Safety Equipment									
BATTERY		RATING:	0	1	2	3	4	(Circle One)	
iquid Levels						*			
Proper Float Voltage on Charger & Battery									
Specific Gravity in Pilot Cell			<del></del>	·				<del></del>	
Personal Protective Equipment									
Connection Corrosion		7.4						1	
eaking Cells				<del></del>					
Dated Solution in Eyewash Station					<del>-</del>	-		<del></del>	
									<del></del>
									<del></del>
YARD & FENCE		RATING:	0	1	2	3	4	(Circle One)	
ire Extinguisher Charged	$\neg$					······	<del></del>	T	
ence Ground Connections					<del> </del>			<del>                                     </del>	
ence Secured	十				····	<del></del>		<del>                                     </del>	
ecurity and Emergency Lights	$\top$					· · · · · · · · · · · · · · · · · · ·		<del>                                     </del>	<del></del>
ite Base and Grade	$\top$								······································
tanding Water	1					<del></del>		<del>                                     </del>	
/arning Signs	$\neg$								

### X Substation - Annual Inspection Guide

- Check equipment for level
- Check condition of concrete pads
- Perform oil and DGA analysis
- Battery
  - ✓ Intercell strap resistance
  - ✓ Individual cell voltages
  - ✓ Cell specific gravity
- Nameplate legible
- Equipment paint condition
- Proper equipment ID labels
- IR / RFI scans and checks

### 6

MEUW - Preventative Maintenance Plan Format

# ANNUAL SUBSTATION INSPECTION FORM

	MAINTENANCE COMPI FTED	ntected By	ာ၁										
1	MAINTE	effem Corrected	Pa										
Substation	COMMENTS	Rating Criteria  0) Good Condition 1) Good Condition 2) Non-critical Maintenance Required 3) Priority Maintenance Required 4) Urgent Maintenace Required											
		3 / RFI scans and checks	##									New Self-to-	1
	¥.	Proper identification labels	4										Man book of
	CRITER	quipment paint condition	3										a respective states in
	NOIL	dameplate legible	1										State of the State St.
nspected by	SUBSTATION INSPECTION CRITERIA	3attery checks - Intercell strap esistance, Individual cell voltages, Sell specific gravity	1										the transfer of the forest of the
spec	UBSTA	ertorm oil and DGA analysis											- 10 X 10
٦	8	Check condition of concrete pads											A Company of the Comp
		Check equipment for level						1		1			and the state of t
Date		EQUIPMENT LISTING	ransformer	TC or regulators	High Voltage Breaker	reeder CBs / Reclosers		witches			Control house battery	Transmission line RFI	

### XI TRANSMISSION - ANNUAL INSPECTION GUIDE

### **STRUCTURE**

- Pole Condition
- Pole Leaning
- Crossarm Condition
- Insulators, Deadend, Pin
- Excess Fill or Soil Removal
- Pole Steps
- Grounds Intact
- Ground Molding
- Down Guys
- Guy Markers
- Guy Bonding/Insulator
- Signage Location Number, Warning Sign
- Customer Equipment
- Conductor
- Tie Wires

### **EQUIPMENT**

- Switches GOAB, Disconnect
  - ✓ Insulator Condition
  - ✓ Operating Handle/Locks
  - ✓ Linkage
  - ✓ Grounding/Bonding
  - ✓ Switch Number
- Arrestor
  - ✓ Insulator Condition
  - ✓ Connections

### **CLEARANCES**

- Ground Line
- Buildings, Bridges, Etc.
- Communications Facilities
- Fuel Tanks
- Other Electric Utilities
- Over Streets, Roads, Alleys, Highways
- Tree Trimming
  - ✓ Clearance From Line
  - ✓ Vines on Poles
  - ✓ Danger Trees

# XI TRANSMISSION - ANNUAL INSPECTION GUIDE (con't)

### RFI CHECK

- Splices
- Connectors
- Dead Ends
- Switches
- Structures

# XII TRANSMISSION - 5 YEAR INSPECTION GUIDE

### IR SCAN

- Splices
- Connectors
- Dead Ends
- Switches

# Date ANNUAL TRANSMISSION INSPECTION FORM

泛

Sub

Inspected by\_

	Date Item Corrected	λ																			
	Date Item	COLECTED																			
SHARMOO	Rating Cri 0) Good C 1) Good C 2) Non-crit Required Maintenan 4) Urgent I																				
١.,	and a mailtaning management			L															T	T	
CNA	Streets, Roads, Alleys	<u>L.</u> .	L																Γ	T	
CLEARANCE	Building Clearances	L.,																			
ਰ		L	_																		
 	Tree Trimming			L																Γ	
EQUIPMENT	Arresters																				
E C	Switches																				
	ВЕІ СРЕСК					T	$\dagger$	†	1	1	_	$\dashv$	$\dashv$	$\top$	1	+	$\dashv$				H
	Conductor and Ties					T	1	$\dagger$	1		7	7	1	十	1	$\dashv$	$\dashv$				H
	Customer Equipment					T	1	$\dagger$	$\top$	7	$\dashv$	$\dashv$	$\top$	+	7	7	$\dashv$				H
	Signs, Loc#, Warning					T	$\dagger$	$\dagger$	$\dagger$	1	$\dashv$	$\top$	$\dashv$	$\top$	$\dagger$	$\dashv$	+		_		$\dashv$
R	Guy Bond, Insulator				 $\vdash$	T	T	$\dagger$	$\dagger$	+	$\dashv$	$\top$	+	$\dagger$	$\dagger$	$\dashv$	+	-			$\dashv$
STRUCTURE	Down Guys and Markers	$\neg$				┞	╁	1	$\dagger$	$\forall$	_	+		$\dagger$	+	$\dashv$	$\dashv$	$\dashv$	$\dashv$	$\dashv$	$\dashv$
300	Grounds Intact, Molding				<del>                                     </del>	1	T	$\dagger$	+	$\top$	$\top$	$\dagger$	+	+	+	+	$\dashv$	$\dashv$	$\dashv$		$\dashv$
STF	Pole Steps				 	-	1	$\dagger$	$\dagger$	$\dagger$	$\dashv$	$\dashv$	+	十	+	+	+	$\dashv$	$\dashv$	$\dashv$	$\dashv$
	Soil Conditions	1				<del>                                     </del>	-	1	+	$\dagger$	+	+	+	+	+	+	$\dashv$	$\dashv$	$\dashv$	$\dashv$	$\dashv$
	Insulators, DE, Pin	1	$\exists$	$\dashv$	 	$\vdash$		$\dagger$	$\dagger$	+		+	+	+	+	+	+	$\dashv$	$\dashv$	$\dashv$	$\dashv$
	Crossarm Condition	7	7	$\dashv$			-	t	+	+	+	+	+	╁	+	+	+	+	$\dashv$	$\dashv$	$\dashv$
	Pole Condition/Leaning	7	7	7			<u> </u>	$\dagger$	$\dagger$	$\dagger$	+	1	+	+	+	╁	+	+	$\dashv$	$\dashv$	-
MAP AREA	LOCATION																				
								L		1							1		$\perp$		